WOODWARD

INVESTIGATION/8D REPORT

Class: 1 Published: 03-JAN-2023 (D8)

CUSTOMER: PRATT & WHITNEY OF CANADA			INVESTIGATION NO: 1182672
CUSTOMER ORDER: Crash Investigation	WOODWARD SALES ORDER: 3831757		WOODWARD WORK ORDER: D023872
CUSTOMER REJECTION DOCUMENT (CAR,QN RFA DMR,ETC.): N/A	WARRANTY DISPOSITION: N/A		PRODUCT STATUS: 1 RCVD
PROGRAM/ENGINE TYPE: P&WC PT6		ITEM RECEIVED: 8063-044	ENGINE MFR. MODEL RECEIVED: 3119892-07
PROGRAM CODE: 83212	SERIAL NUMBER: 18854768	ITEM SHIPPED: 8063-044	ENGINE MFR. MODEL SHIPPED: 3119892-07
PARENT ITEM NUMBER: 8063-044	PARENT ITEM SERIAL NUMBER: 18854768	FIRST SHIPPED: 15-AUG-2013	LAST SHIPPED: 15-AUG-2013
CUSTOMER SERIAL NUMBER: N/A	APPLICATION: N/A	VESSEL TYPE & VESSEL NUMBER: N/A N/A	SITE & LOCATION GRID ID: N/A N/A
TIME/CYCLES SINCE NEW, OVERHAUL, OR REPAIR			

DATE REPORT OPENED: 20-OCT-2022	DATE PART REMOVED: N/A	DATE RECEIVED: 19-OCT-2022

TEAM MEMBERS (D1)

Product Engineer: Andrew Saavedra
Customer QA Engineer: Daniel Hintz
Tech Advisor/Reviewer: Jeffrey T. Sympson
Customer Account Manager: Brian Barthel
Customer Service Rep: SHANNON L. COTE
Product Integrity Coordinator: Matthew Zolnierczyk

REASON FOR INVESTIGATION (D2)

Reported Issue: INCIDENT: February 2, 2022 at Long Island MacArthur Airport (ISP), Ronkonkoma, New York EVENT DESCRIPTION: On February 2, 2022, about 0656 eastern standard time a Pilatus PC-12/47E, N357JK, was substantially damaged when it was involved in an accident at Long Island MacArthur Airport (ISP), Ronkonkoma, New York. The commercial pilot and a pilot-rated passenger were not injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight The pilot stated that after the pilot-rated passenger joined him in completing the cockpit checklist they prepared for engine start with the airplane's parking brake applied. While pushing on the toe brakes he pushed the starter switch and verified that the oil pressure was rising and the compressor turbine (Ng) had increased to 13%. At 13%, he noted the temperature of the engine oil, and moved the condition lever to flight idle per the checklist. He observed Ng increase to 40% and felt the airplane "lurching forward." He pressed harder on the toe brakes, but the airplane continued forward while the engine spooled-up. The airplane was fast approaching a parked, unoccupied Hawker 1000 airplane. The pilot reached to secure the Condition Lever, but his thumb slipped off the securing device. The Pilatus impacted and extensively damaged the Hawker. The right wing of the Pilatus separated during the impact sequence. The engine continued to operate, and the pilot-rated passenger stated that he assisted the pilot by moving the Condition Lever to the Cut-Off/Feather position, pulled the Fuel Shutoff and ACS Bleed control levers."

CONTAINMENT/IMMEDIATE ACTIONS (D3)

INVESTIGATION SUMMARY (D4)

Confirmation Text: DID NOT CONFIRM REASON FOR INVESTIGATION/RETURN
Discrepant Item Number: NA
Discrepancy: No Discrepancy Found
Finding: No Findings
Conclusion:

The PT6A-67B FCU was returned with the following customer hardware: customer fitting on all the ports (inlet, discharge, and air), M/O full linkage, and P/L full linkage. Customer hardware was removed and visual as-received was performed. Foreign lockwire was found on the deadband screw, delta P, condition lever cam follower, and lawnmower screw. This would indicate that the customer had adjusted the FCU since last shipped from Woodward. Woodward lockwire was present on the condition lever screw and P3 ratio plug.

Slight damage to the threads of the magnetic pickup was observed. Additionally, a nick on the housing below the housing part number stamp was noticed. No additional damage to the FCU was noted.

The FCU was as-received tested. The speed setting points (Low Idle, High Idle, Max Fwd, and Max Rev) were out per ATP limits by up to .01% to 7.61%. However, speed setting points are normal customer adjustment.

Shutoff leakage with the condition lever set at 8 degrees was out per ATP limits with a discharge flow of 135.0 PPH (Limits: 0.5 cc/min. Max). The FCU reached shutoff with the condition lever set at 4 degrees. The min stop of the condition lever was found within ATP limits, at 1 degree (Limits: 0-3 degrees). The event description indicates that the airplane

lurched forward with the condition lever at flight idle, therefore this test point being high is not related to the reported problem. The event description also indicates fuel flow did shutoff when the passenger moved the condition lever to the cut-off/feather position and pulled the fuel SO and bleed control levers.

Multiple test points in the start and acceleration schedule were found out per ATP limits. The first point in the acceleration schedule (@ 810 RPM, Max PLA) was recorded at 118.0 pph (Limits: 101.0-111.0 pph). Normal engine start is done with the PLA at the low idle position. There is no indication from the reported problem that anything other than a normal start was attempted. The remaining start and acceleration test points were .03% to 2.83% above max ATP limits. The CDP schedule had two test points that were between 0.34% to 1.40% above max ATP limits. These out of tolerance test points would have not contributed to the reported problem. Remaining ATP test points were within ATP limits.

The out of limit test points did not preclude normal operation of the FCU and are not considered a contributor to the reported problem. Therefore it was agreed to not perform disassembly.

ROOT CAUSE (D4)

Origin of Cause: FIELD / END CUSTOMER (OWNER)
General Cause: No Problem Found
Cause: No Problem Found or Identified
Cause Notes:

CORRECTIVE ACTION PLAN (D5)

General Corrective Action: No Action without Additional Customer Input
Specific Corrective Action: No Direct Action, Continue to Monitor
Corrective Action:

CORRECTIVE ACTION IMPLEMENTATION (D6)

Corrective Action Status: NO ACTION

Desc: AMTDS - CMM 73-20-09, PROJECT 83212, OVERHAUL/REPAIR
Date: 29-NOV-2022
IMTPC - TEST SPECIFICATION RESULTS PRINT REPORT

Serial No: 18854768 Run No: 2 Work Order: D023872 Item No: 8063-044
Current Status: A Run Status: F Test Type: AR Test Date: 29-NOV-2022

Test Point		Record	Units	Formula Tag	Min	Value	Max	Pass Fail
1.0	SUBTASK 73-20-09-770-009, 3.I. Power Lever Test							
1.1	TR 73-21, (c), (TR 73-20, (4) Low Idle Adjustability (+ direction), (a) Table 111 Test Point 2)	Wf	pph		159.0		161.0	
1.2	TR 73-21, (f) Start and Acceleration Test Table 119, Test Point 17	Wf	pph		110.0		120.0	
1.3	TR 73-22, (4) Low Idle Adjustability (-- direction), (b)	Wf	pph		50.0		160.0	
2.0	SUBTASK 73-20-09-770-010, 3. J. Condition Lever Test							
2.1	TR 73-26, (b), (TR 73-25, (3) High Idle Adjustability (-- direction))	Wf	pph		287.0		289.0	
2.2	TR 73-26, (d) Table 119, Test Point 13, (TR 73-25, (3) High Idle Adjustability (-- direction))	Wf	pph	DS	121.0		135.0	
2.3	TR 73-26, (f), (TR 73-25, (3) High Idle Adjustability (-- direction))	Wf	pph	DF	UNAVAILABLE		UNAVAILABLE	
2.4	TR 73-26, (g), (TR 73-25, (3) High Idle Adjustability (-- direction))	=DF-DS			-2.0		2.0	
2.5	TR 73-26, (g), (TR 73-25, (3) High Idle Adjustability (-- direction))	=DS			121.0		135.0	
3.0	SUBTASK 73-20-09-770-013, 4.B. Pressure and Internal Leakage Test							
3.1	(3) Pressure Test	P1	psig	P1	0	1330	1500	P
3.2	(3) Pressure Test	Pb	psig	PB	0	60	200	P
3.3	(3) P1-Pb	=P1-PB			0	1270	1350	P
3.4	(4) Pressure Test	P1	psig	P11	0	1320	1500	P
3.5	(4) Pressure Test	Pb	psig	PB1	0	60	200	P
3.6	(4) P1-Pb	=P11-PB1			1201	1260		P
3.7	(6) Pressure Test	External Leakage				PASS		P
3.8	(7) Pressure Test	OBD Leakage	cc_min			PASS		P
3.9	(9) Internal Leakage Test	Wi	pph	WI	120.0	249.0	2100.0	P
3.10	(9) Internal Leakage Test	Wf	pph	WF	164.0 (Calc)	173.0	249.0 (Calc)	P
3.11	(9) Internal Leakage Test	=WI-WF			0.0	76.0	85.0	P
4.0	SUBTASK 73-20-09-770-014, 4.C. Condition Lever and Shutdown Test							
4.1	Table 116 - Condition Lever Test, Test Point 1	Speed	crpm		4216	4242	4236	FAIL
4.2	Table 116 - Condition Lever Test, Test Point 2	Speed	crpm		5074	4865	5094	FAIL
4.3	Table 117 - Shutdown Test, Test Point 1	Discharge_Flow	cc/min		0.0	135.0	0.5	FAIL
4.4	Table 117 - Shutdown Test, Test	Wf	pph		113.0	136.0	1500.0	P

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Test Point		Record	Units	Formula Tag	Min	Value	Max	Pass Fail
	Point-2							
4.5	(3) Condition Lever and Shutdown Test	Lever Position	deg		0.0	1.0	3.0	P
4.6	(4) Condition Lever and Shutdown Test	Lever Position	deg	SO_MAX	38.0	42.0	46.0	P
5.0	SUBTASK 73-20-09-770-015, 4.D. Power Lever Test							
5.1	Table 118 - Power Lever Schedule, Test Point 1	Speed	crpm		5313	5739	5333	FAIL
5.2	Table 118 - Power Lever Schedule, Test Point 2	Speed	crpm		6502	6528	6522	FAIL
5.3	(2) Power Lever Test	Speed	crpm		4290	4367	4446	P
5.4	TR 73-18 4.D(4) Protractor reading A (Power Lever Test)	PLA	deg	015_A	-50.0	-38.0	80.0	P
5.5	TR 73-18 4.D(4) Protractor reading B (Power Lever Test)	PLA	deg	015_B	-29.0 (Calc)	-20.0	-17.0 (Calc)	P
5.6	TR 73-18 4.D(4) Subtract B from A. (Power Lever Test)	=015_A-015_B			-21.0	-18.0	-9.0	P
5.7	(5) Power Lever Test	PLA	deg	015_C	-1.0 (Calc)	0.0	1.0 (Calc)	P
5.8	(5) Power Lever Test	=015_C-015_B			19.0	20.0	21.0	P
5.9	(6) Power Lever Test	PLA	deg	015_D	53.0 (Calc)	53.0	59.0 (Calc)	P
5.10	(6) Power Lever Test	=015_D-015_C			53.0	53.0	59.0	P
6.0	SUBTASK 73-20-09-770-017, 4.F. Start and Acceleration Test							
6.1	Table 119 - Start and Acceleration Test, Test Point 1	Wf	pph		101.0	118.0	111.0	FAIL
6.2	Table 119 - Start and Acceleration Test, Test Point 2	Wf	pph		128.0	144.9	142.0	FAIL
6.3	Table 119 - Start and Acceleration Test, Test Point 3	Wf	pph		186.0	207.0	206.0	FAIL
6.4	Table 119 - Start and Acceleration Test, Test Point 4	Wf	pph		218.0	242.6	242.0	FAIL
6.5	Table 119 - Start and Acceleration Test, Test Point 5	Wf	pph		247.0	270.7	271.0	P
6.6	Table 119 - Start and Acceleration Test, Test Point 6	Wf	pph		302.0	328.1	328.0	FAIL
6.7	Table 119 - Start and Acceleration Test, Test Point 7	Wf	pph		430.0	465.6	466.0	P
6.8	Table 119 - Start and Acceleration Test, Test Point 8	Wf	pph		470.0	509.8	510.0	P
6.9	Table 119 - Start and Acceleration Test, Test Point 9	Wf	pph		524.0	568.4	568.0	FAIL
6.10	Table 119 - Start and Acceleration Test, Test Point 10	Wf	pph		571.0	623.0	619.0	FAIL
6.11	Table 119 - Start and Acceleration Test, Test Point 11	Wf	pph		840.0	855.0	860.0	P
6.12	Table 119 - Start and Acceleration Test, Test Point 12	Wf	pph		89.0	101.6	103.0	P

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Current Status: A Run Status: F Test Type: AR Test Date: 29-NOV-2022

Test Point		Record	Units	Formula Tag	Min	Value	Max	Pass Fail
6.13	Table 119 - Start and Acceleration Test, Test Point 13	Wf	pph		121.0	137.8	135.0	FAIL
6.14	Table 119 - Start and Acceleration Test, Test Point 14	Wf	pph		81.0	88.1	91.0	P
6.15	Table 119 - Start and Acceleration Test, Test Point 15	Wf	pph		88.0	95.4	98.0	P
6.16	Table 119 - Start and Acceleration Test, Test Point 16	Wf	pph		99.0	107.8	109.0	P
6.17	Table 119 - Start and Acceleration Test, Test Point 17	Wf	pph		110.0	121.7	120.0	FAIL
6.18	Table 119 - Start and Acceleration Test, Test Point 18	Wf	pph		138.0	152.2	148.0	FAIL
7.0	SUBTASK 73-20-09-770-018, 4.G. CDP Test							
7.1	Table 120 - CDP Test, Test Point 1	Wf	pph		264.0	290.0	286.0	FAIL
7.2	Table 120 - CDP Test, Test Point 2	Wf	pph	018_A	403.0	431.0	437.0	P
7.3	Table 120 - CDP Test, Test Point 3	Wf	pph		538.0	584.0	582.0	FAIL
7.4	Table 120 - CDP Test, Test Point 4	Wf	pph	018_B	50.0	434.0	1000.0	P
7.5	G. CDP Test (2)	=018_B-018_A			-5.0	3.0	15.0	P
8.0	SUBTASK 73-20-09-770-019, 4.H. CDP-Py Schedule							
8.1	Table 121 - CDP-Py Schedule, Test Point 1	Wf	pph		645.0	706.0	713.0	P
8.2	Table 121 - CDP-Py Schedule, Test Point 2	Wf	pph		512.0	553.0	566.0	P
9.0	SUBTASK 73-20-09-770-020, 4.I. Deceleration Schedule							
9.1	Table 122 - Deceleration Schedule, Test Point 1	Wf	pph		314.0	351.0	387.0	P
9.2	Table 122 - Deceleration Schedule, Test Point 2	Wf	pph		254.0	282.0	315.0	P
9.3	Table 122 - Deceleration Schedule, Test Point 3	Wf	pph		178.0	196.0	223.0	P
9.4	Table 122 - Deceleration Schedule, Test Point 4	Wf	pph		75.0	79.2	80.0	P
10.0	SUBTASK 73-20-09-770-021, 4.J. Governor Droop Test							
10.1	(1) Table 123 - Governor Droop Test, Test Point 1	Wf	pph	021_A	50.0	678.0	1500.0	P
10.2	(2) Table 123 - Governor Droop Test, Test Point 2	Wf	pph	021_B	482.0 (Calc)	506.0	548.0 (Calc)	P
10.3	(3) Governor Droop Test	=021_A-021_B			130.0	172.0	196.0	P
10.4	(4) Governor Droop Test, (see CMM for Wf set point tolerance)	Speed	crpm		6459	6470	6479	P
10.5	(5) Table 123 - Governor Droop	Wf	pph	021_C	50.0	176.0	1500.0	P

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Test Point		Record	Units	Formula Tag	Min	Value	Max	Pass Fail
~~Test, Test Point 4~~								
10.6	(6) Table 123 - Governor Droop Test, Test Point 5	Wf	pph	021_D	143.0 (Calc)	147.0	153.0 (Calc)	P
10.7	(7) Governor Droop Test	=021_C-021_D			23.0	29.0	33.0	P
11.0	SUBTASK 73-20-09-770-022, 4.K. Lever Torques							
11.1	TR 73-14, (3), (Lever Torques)	Power Lever Torque	lb_in		0.0	3.5	10.0	P
11.2	TR 73-14, (4), (Lever Torques)	Power Lever Torque	lb_in		0.0	4.0	10.0	P
11.3	(7), Lever Torques	Shutoff Lever Torque	lb_in		0.0	21.0	27.0	P
11.4	(8), Lever Torques	Shutoff Lever Torque	lb_in		0.0	6.0	14.0	P
11.5	(9), Lever Torques	Power Lever Torque	lb_in		0.0	8.5	10.0	P
11.6	(10), Lever Torques	Power Lever Torque	lb_in		0.0	8.0	10.0	P
11.7	(11), Lever Torques	M/O Lever Torque	lb_in		0.0	5.5	7.0	P
12.0	SUBTASK 73-20-09-770-025, 4.N. Manual Override Lever Schedule							
12.1	(2) Table 125 - Manual Override Lever Schedule, Test Point 1	Wf	pph		530.0	549.0	650.0	P
12.2	TR 73-17, (3) (Manual Override Lever Schedule)	M/O Lever Angle	deg		0.0	0.0	1.0	P
13.0	SUBTASK 73-20-09-770-026, O. Speed Probe Schedule							
13.1	(2), Speed Probe Schedule	Mag. Pickup Output	VDC		0.40	0.56	2.00	P
13.2	(4), Speed Probe Schedule	Mag. Pickup Freq.	Hz		994	1043	1094	P
14.0	TASK 73-20-09-770-804, 4. Final Testing							
14.1	SUBTASK 73-20-09-770-012, A. Preparation For Final Testing, (2)	Result				DRY		P

The following criteria were used to run this report:
Serial No: 18854768
Run Number: 2
Status:
Run Type:
Work Order Number:
Order By: 1

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* End of IMTPC *
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